APPLIED SYSTEMS APPROACH TOWARDS SUSTAINABLE DEVELOPMENT AND PROMOTION OF PROTECTED ROCK ART HERITAGE SITES IN INDIA

Synopsis for Ph. D. in Management

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by

Ram Krishna

Research Scholar

Department of Management
Faculty of Social Sciences
Dayalbagh Educational Institute, Agra

Supervisor

Prof. Sanjay Bhushan
Department of Management
Faculty of Social Sciences
Dayalbagh Educational Institute,
Dayalbagh, Agra

Co-Supervisor

Prof. Sanjeev Bhatnagar
Department of Management
Faculty of Social Sciences
Dayalbagh Educational Institute,
Dayalbagh, Agra

1. INTRODUCTION

1.1 ROCK ART A GLOBAL HERITAGE

Rock art is a global phenomenon. It forms the archaic visual manifestations of human creativity and his perception of reality created on the bare surface of rocks. Other form of human creations could not survive the vagaries of time hence it is the only source for understanding the processes of our development (Kumar, 2015) as humans.

India is one of the three countries having the richest treasures of rock art in the world. Other two are Australia and South Africa (Bednarik, 2008). Brazil, Saudi Arabia and China are also emerging as countries rich in rock art heritage (Kumar, 2015).

Rock art is found in the lap of nature in different geological, geographical and climatic conditions. It is executed either by deductive technique (by bringing out something from the rock such as different forms of petroglyphs) or by additive technique (by applying paint on the surface of the rock). Rock Art is found throughout the India. It includes the regions in between the Vindhya Hills and Aravalli Hills in the east and west and the Ganges system in the north. It is followed by Karnataka, Andhra Pradesh, Telangana, Kerala and Tamilnadu in south India, Orissa in the east, the Kaimur range in Jharkhand and Bihar, Leh and Ladakh in the Himalays in the north, the deserts of Rajasthan and Gujarat in the west. A few rock art sites have also been reported from northeast hill States in the eastern Himalays and in the Shivalik ranges in Himachal Pradesh. Goa and coastal Maharashtra are unique in presenting rock art in the laterite regions (Wakankar, 1978), (Kumar, 2015).

1.2 ROCK ART HERITAGE AN INTEGRATIVE SYSTEM IN INDIA

An Integrative system of Rock Art Heritage is comprised of following actors and stakeholders.

a. **Aboriginal people -** Rock Art sites are the heritage of the humanity so it is the property of public and local community around the site. Involvement of aboriginal people is must for achieving successful fulfilment of responsibilities of management and protection of the Rock Art site as they are the real owners of the site.

b. **Academicians -** All the efforts of preservation and protection is to pass this knowledge to the future generations. Researchers and academicians are the first person to discover, identify, establishing the antiquity of site. They are the one who understand the knowledge and translate it for everyone.

c. **Custodians** of the sites are the Archaeological survey of India (at National level) and State Archaeology (at state level). Who is responsible for managing conservation and protection from every aspect within 300 m of the site.{Environment (macro) , human interaction(micro)} to preserve and transmit it for the future generations.

d. **Owners -** Department of forest (the sites are usually found in forests), Department of revenue (where the forest is gone) are the owners of the land on which site is located. Archaeological Survey of India and State Archaeology Department in some cases.

e. **Department of Tourism -** Department of Tourism is responsible and having executive authority for hospitality, travel, connectivity and other development and promotion of site. Again no plan can be executed until owner and custodian of the site, both are in favour. Disagreement of any of them discourages the proposal.

f. **Tourists -** As heritage for mankind. It is obvious to have visitors interest in uniqueness of Rock Art with the twist of prehistoric mysteries, surrounded by Mother Nature. Making it irresistible as the destination for tourism. Where traffic of visitors creates another level of challenges to meet. Generated by human interaction to the site. It varies from vandalism to encroachment in many different ways. Every type of visitor holds the different type of challenge for the protection. It mostly attracts academicians / researchers (national, international), domestic visitor (mostly local people), global visitors (interested in uniqueness of the destination).

g. **Private partners –** Multiple issues are taken care as per the need to fulfil the requirement of the site as Government cannot do everything of its own. Specially to develop tourism multiple of engagement takes place.

1.3 ROCK ART DEVELOPMENT AND PROMOTION

Promotion of Rock Art is treated as heritage promotion in which conservation is the inseparable and most important factor of it. Conservation leads to protection also. Being the heritage, it has to be protected officially by state or national or authorities responsible for it. Like other heritage development and promotion of rock art heritage in specific is not simple. Because of the involvement of many stake holders that is Department of Tourism, ASI (Archaeological Survey of India), State Archaeology, Department. of Forest, local community, travel, Transportation, hospitality industry and UNESCO is very essential. Different stake holders develop the need to deliver and facilitate the exchange of communications, minimum interest fulfilment and expertise among all of them fulfilling different responsibilities assigned to them. Three of the major stake holders that are Dept of Tourism and ASI, are presently responsible for development, promotion and conservation purpose respectively have to work in coordination with Dept. of Forest. For instance the toilets are constructed at Bhimbetka by Dept. of Forest on demand of Archaeological Survey of India.

UNESCO being the highest global authority functioning towards the protection and conservation of heritage sites. UNESCO awards World Heritage status to a site with the concept in the direction sustainable development. World Heritage title itself works as the most powerful tool for global promotion and attracts international, domestic visitors.

1.4 WORLD HERITAGE CONVENTION AND ITS ROLE

World Heritage convention was adopted by members of the UNESCO in 1972. UNESCO Convention established the World Heritage Committee and its funds which became operational since 1976. "The *Convention* aims at the identification, protection, conservation, presentation and transmission to future generations of cultural and natural heritage of Outstanding Universal Value". It is an intergovernmental committee for the protection of the world cultural and natural heritage. Cultural heritage involves monument, group of buildings, sites etc. Natural heritage is considered as natural features with physical and biological formations, geological and physiographical formations, natural sites(precisely delineated natural areas) with outstanding universal value from scientific, aesthetic,

conservation and beauty point of views. World Heritage Site status is given by them United Nations Educational, Scientific and Cultural Organization (UNESCO). UNESCO considers world heritage sites as the spirit of collective interests of mankind. The protection of the site is done as per the international treaties. ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property), ICOMOS (International Council on Monuments and Sites) and ICUN (International Union for Conservation of Nature and Natural Resources) works as advisory bodies to the World Heritage committee (UNESCO operational guidelines 2016). There are 1073 listed World Heritage sites in the world by 2017. Italy is at number one with 53 sites and India holding 6th position with 36 World Heritage sites (whc.unesco.org). Bhimbetka complex of painted rock shelters is the only Rock Art World Heritage site in India. World Heritage status itself works for sites as tool for global promotion.

1.5 ROCK ART AND TOURISM IN INDIA

Rock Art Heritage has remained untapped cultural resource for the sustainable development of India. Tourism itself rising as one of the prominent industry in India, expecting a growth to GDP contribution of 8.31 lakh carore (USD 130 Billion) or 6.3 % of National GDP in 2015 and 37.315 million in terms of jobs. Annual growth is projected with the average rate of 7.5 % till 2025 that makes hospitality industry as a good prospect to flourish and nurture (www.ibef.org/industry/tourism-hospitality-india.aspx). Bhimbetka the only rock art world heritage site in India received 85,000 visitors (approx rounded off) in previous year (Telephonic discussion with Range Officer J.K.Gupta, Bhimbetka site). That inspires to explore the possibility of Rock Art heritage of India to become a major contributor in India's GDP.

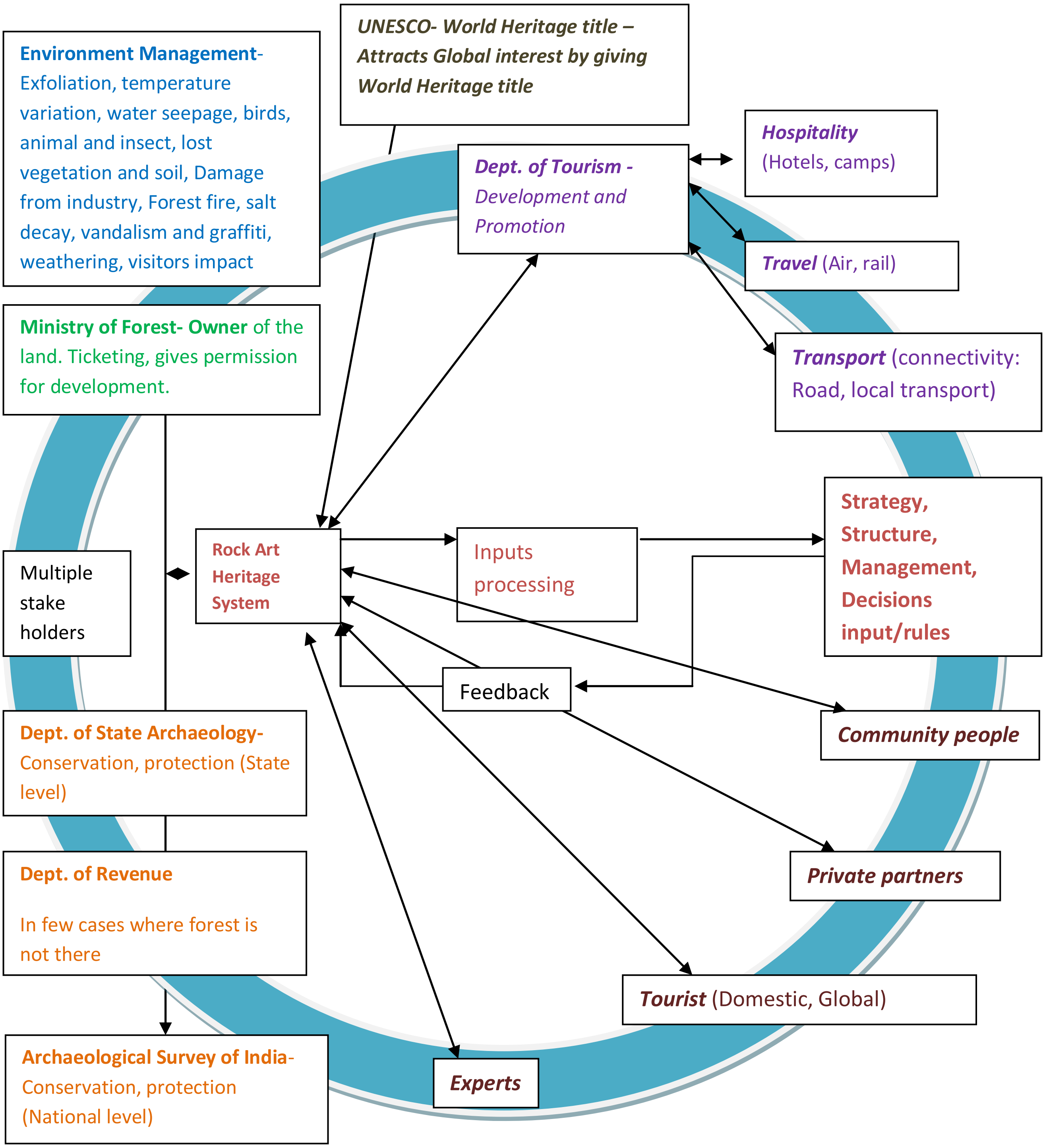
1.6 SYSTEMS APPROACH AND ITS SIGNIFICANCE IN PROBLEM ANALYSIS

System thinking – It is an ability to see the world as complex system, in which we understand that "You can't just do one thing" and that "everything is connected to everything else" (John Sterman).

It is a “Management thinking that emphasizes the interdependence and interactive nature of elements within and external to an organization.” (Buisenessdirectory.com)

Systems approach promises to understand the complex systems of Rock Art Heritage development and promotion, where various inputs of stakeholders and of environment making the impact shall be analysed towards optimally utilising the resources and improving its overall scenario of its development and promotion. Systems approach is used to understand the dynamics of all complex systems. According to systems approach, everything is interrelated and interdependent. Basic concept is to look at the problem as a whole not as a part. Application of this approach makes possible to bring out complexities and its solutions of internal and external connections used for communication and execution among stake holders. The system components responsible for holistic promotion of Rock Art Heritage site can be categorised as Internal components (Factors inside the site premises) and external (Factors outside the premises). Internally it will include all the actions and requirements for visitor’s management, conservation and protection of heritage site. Tourism and promotion can be considered as external factor as they work outside the site premises. Communication and information are exchanged as per need of the Department of Tourism, Department of Forest and the ASI to promote and protect the site respectively. It needs a coordinated and integrated output for the heritage promotion and conservation. As, Rock Art sites are considered under culture tourism and eco tourism, the most complex part is managing the relevant stake holders priorities, level of involvement, mutual interest fulfilment and resolving any probable conflict as well.

1.7 INTERACTIVE CONCEPTUAL MODEL OF ROCK ART HERITAGE SYSTEMS



(Pers. discussion with S.B Ota, 2017, Zulfequar Ali, 2017, D.K. Singh, 2017)

2. LITRATURE REVIEW

2.1 GLOBAL PERSPECTIVE

1	1. Monitoring visitor behaviour at rock art sites, 2. Identifying high risk visitors at Aboriginal art sites in Australia (Kakadu National park)	F Gale F Gale, J Jacobs	1985 1986
	Description The paper discussed the threat imposed by issue of increased number of tourists in Australia. The preliminary study was done at two sites in Australia which were expecting the most threat at the Kakadu site complex and Ayers Rock .Gal and Fay initiated the work to manage the visitor pressure bearing the site in 80’s and developed the preliminary experimental study. He extended his work next year studying the different group of tourists and suggested few strategies in 1986.		
2	The rock art of Coa valley, Portugal: Significance, conservation and management	Joao Zihao	1998
	Description This paper discussed the significance of the rock art and the superiority over infrastructural development. The dam construction project was stopped in 1995 and a 200km^2 to save the Rock Art and instead archaeological park was established with the management to safeguard it and promote the cultural evidence.		
3	Aboriginal tourism-a linear structural relations analysis of domestic and international tourist demand	Ryan, Chris, Huyton, Jeremy	2000
	Description Author has discussed the visitors and their interest to understand the demand aboriginal tourism products of tourism by analysing 471 visitors.		
4	Rock Art sites in Victoria Australia: a management history framework	Ian D Clark	2002
	Description Author has discussed the history of management at the site and detailed the management Challenges, importance of past planning and suggested a framework.		

5	Management plan for the Chongoni Rock Art site	Dr. Elizabeth M. Gomani	2004
	Description Author tried to suggest a comprehensive policy framework for conservation and management Cultural heritage preservation for posterity, education and national identity with full consultation of all the stake holders to gather necessary information, determine values, identification of key values, goals, objectives, policies and strategies.		
6	Rock Art Tourism in Southern Africa: Problems, Possibilities, and Poverty Relief	B. Smith	2006
	Description Author considered successes and failures in the history of rock art management and presentation in southern Africa. It was argued that public rock art sites have a key role in national identity, poverty relief and job creation and makes a strong case for a management process in rock art tourism development based on carefully negotiated partnerships between landowners, local communities, archaeologists, and heritage managers.		
7	Rock Art Conservation and Tourism	Janette Deacon	2006
	Description According to author Rock art conservation has developed hand-in-hand with the increased pace of tourism, yet the two activities tend to remain in opposing camps. Policies and guidelines have been developed for cultural heritage and cultural tourism and there is a widely accepted range of principles in place, but a theory of sustainable rock art tourism is only in its infancy. To mature the discipline needs research into the interaction of key elements that affect the long-term conservation of frequently visited rock paintings and engravings in their original setting, as well as consideration of social and economic factors that drive tourism and the public interest in rock art.		
8	Navigating towards sustainable development: A system dynamics approach	P Hjorth, A Bagheri	2006

	Description Author described the system in which humans are involved is characterized by the following essential system properties: Bounded rationality, limited certainty, limited predictability, indeterminate causality, and evolutionary change. Need to resort to an adaptive approach, where go through a learning process and modify decision rules and mental models of the real world . This will enable to improve system performance by setting dynamic improvement goals (moving targets) for it. Finally, it was demonstrated how causal loop diagrams can be used to find the leverage points of a system.		
9	Working in a UNESCO World Heritage Site. Problems and Practices on the Rock Art of Tadrart Akakus(SW Libia Sahara)	Savino di Lernia, Marina Gallinaro	2011
	Description The Tadrart Akakus in SW Libya was awarded this status in 1985. Author discussed the threats imposed by tourism, infrastructure, oil exploitation. Holocene art sites eas facing survival challenges . As per author failure of the central authorities and local stakeholders. Different simple solutions were suggested. Author demonstrate that importance of simple measures integrated in a comprehensive inter-and multi-disciplinary study of rock art contexts (in particular, statistical and GIS analysis) and represented the best way to help politicians and stakeholders to dynamically manage a cultural heritage site.		
10	Reorganising space and time: A comparative analysis of the heritage development of the Chauvet cave and the Millau viaduct	Nicolas Senil	2011
	Description This study considers the heritage development process of the two sites of the Chauvet cave and the Millau viaduct. The journey of action is in continuation. Comparative study described how heritage creation process is different for individual site.		
11	Safeguarding a fragile legacy: Managing uKhahlamba-Drakensberg Rock Art	Jo McDonald, Peter Veth, Aron Mazel	2012

	Description Author investigated the efficacy of recent developments. Emphasis is on the partial implementation of management recommendations and the reasons for this as institutional responsibilities, Inventories, Planning, Implementation and Indigenous Voices.		
12	Rock art tourism in the uKhahlamba/Drakensberg World Heritage Site: obstacles to the development of sustainable tourism	Melanie duval, Benjamin smith	2012
	Description According to author rock art sustainability is possible only within an effective management framework. The paper explored tourism and management dynamics. Tourism patterns, markets and frequencies, together with rock art's low place within tourist agendas. Despite rock art needing tourism to valorise its conservation, and being recognised by commentators and the state as a viable route to tourism development, heritage conservation, socio-economic regeneration and cultural empowerment, the failure to reform entrenched and ineffective tourism/conservation governance and management systems was exposed.		
13	Contemporary Issues in Cultural Heritage Tourism	J Kaminski, D Arnold, AM Benson	2013
	Description Reflecting the increasing application of cultural heritage as a driver for tourism and development, the book covered a broad range of theoretical perspectives of cultural heritage tourism; regeneration, policy, stakeholders, marketing, socio-economic development, impacts, sustainability, volunteering and ICT. It took a broad view, integrating international examples of sites, monuments as well as intangible cultural heritage and modern art museums.		
14	Cultural Heritage Marketing	Virginia Jureniene , Martynas Radzevicius	2014
	Description Heritage industry supports the originality and identity in globalized world. In addition, the heritage industry provides tangible economic benefits: it encourages the development of tourism, help to create jobs and expand domestic business. So it is obvious that an attractive and		

	interesting national cultural heritage provides a significant added value to the country and local communities. This requires a good understanding of marketing heritage because heritage site success clearly depends on whether the heritage is able to engage consumers. The article discusses the heritage site marketing, its major principles, as well as featured in heritage marketing tools that can help in the development of the heritage area and attract visitors.		
15	New Digital Technologies Applied to the Management of Geoheritage	Nathalie Cayla, Fabien Hobléa, Emmanuel Reynard	2014
	Description Nathalie Cayla proposed a review of existing and emerging technologies for the depiction and interpretation of geo sites. Three main topics in particular are analysed: Geo referencing and mapping of geo heritage, 3D digital imaging (including photogrammetry and laser scanning) and experiments in the promotion of geo heritage using augmented reality (a process which enriches discovery through digital media, or provides a virtual reality with which one can engage). including high-tech digital monitoring and 3D-modelling technologies combining laser scanners, digital cameras and sensors.		
16	Seeking sustainable tourism of Rock Art: The example of Maloti-Drakenceberg park: World heritage site	Melanie duval , Benjamin smith	2014
	Description Author's aim of paper was to go beyond a binary opposition approach that pits preservation Against tourism development, and to determine the ways in which tourism can contribute to the preservation of rock art sites. The results presented derive from research conducted in the region of the uKhahlamba-Drakensberg Park (UDP) of South Africa. We examine how an analysis of tourist practices and motivations can be used in the development of sustainable rock art tourism. Specific attention is paid to the identification of different types of visitors to the area, their reasons for visiting and their practices while there. Five main types of visitors were identified: 'hedonists', 'outdoor and sports tourists', 'information seekers', 'rock art enthusiasts' and 'g		

	sightseers'. This understanding of the types of tourist visiting the UDP led us to determine a set of actions that might be taken to develop sustainable rock art tourism in the area.		
17	H.I.S.A. Study Marketing of heritage sites	Andrea Cenderello	2015
	Description Nathalie Cayla proposed a review of existing and emerging technologies for the depiction and interpretation of geo sites. Three main topics in particular were analysed: Geo referencing and mapping of geo heritage, 3D digital imaging (including photogrammetry and laser scanning) and experiments in the promotion of geo heritage using augmented reality (a process which enriches discovery through digital media, or provides a virtual reality with which one can engage). including high-tech digital monitoring and 3D-modelling technologies combining laser scanners, digital cameras and sensors. In the same way for the study of Karsts Geo sites in Southern France, study was done by Fabien Hoblea, Jean-Jacques Delannoy, Stéphane Jaillet, Estelle Ployon, Benjamin Sadier.		
18	Rock Art a culture treasure at risk	Neville Agnew, Janette Deacon, Nicholas Hall, Terry little, Sharon Sullivan, Paul Tacon	2015
	Description The document focuses on experience of examples from Africa and Australia, it sets out a vision for the future conservation of rock art which will be relevant to rock art conservation in many regions of the world. The issues it identifies and the foundation principles and actions it proposes are based on internationally recognized and well-founded conservation management principles. It is hoped this document will be widely disseminated, used, critiqued and over time be adapted and improved.		
19	Replication for Chauvet Cave	N. James	2016
	Description As radiocarbon dates were announced, the wall paintings and engravings in Chauvet Cave, France Soon after discovery, in 1994, the cave was closed to protect the images from chemical and microbial damage. In 2014, it was added to the World Heritage List. Then, in April 2015, replicas		

	of the most striking imagery were opened at a purpose-built site, the Caverne du Pont d'Arc. With the objective of sustaining development, promotion and conservation of heritage simultaneously.

2.2 NATIONAL PERSPECTIVE

1	Some suggestions for the management of Bhimbetka	R.G. Bednarik, with comments by M. N. Deshpande, K. V. Soundararajan, R.C. Agrawal, V. H. Bedekar, G. Kumar,Tej Singh And author's reply	1994
	Description Author suggested Indian experts and officials about the key points on how to bring Bhimbetka site complex near Bhopal in word heritage, in the paper for non-intervention preservation and management suggestion were made. Paper includes the comments of Indian experts and ASI officia comment. It was the for the first time the Rock Art management was suggested in India.		
2	Socio-Economic Development in India : A regional Analysis	Abhiman Das	1999
	Description Author discussed that several indicators have been developed using principal component analysis and states are arranged according to the indices derived using four broadly accepted components: (a) economic production and economic condition or in other words level of economic development; (b) common minimum needs; (c) health and health-related services and (d) communication. The findings of the analysis clearly emphasize the role of government action and well-functioning public actions in improving the overall living conditions of the people. Although economic growth in the sense of expanding gross national product and other related variables is one of the most fundamental input to the overall development process, the basic objective of development should focus on the expansion of human capabilities which has been neglected for long in India.		
3	Rock shelters of Bhimbetka: continuity through antiquity, art and environment management	R Ray and AR Ramanathan	2002

	Description This document was prepared by the Archaeological Survey of India as a proposal to UNESCO to get World Heritage status for Bhimbetka painted rock shelter complex. Explaining its antiquity and the proposed management plan for the site. This takes care of all the norms provided by the UNESCO World Heritage convention. It took eight years to implement on paper after 1994.		
4	Declaration of painted rock Shelters of Bhimbetka as world heritage and its management initiatives	S.B. Ota	2005
	Description In this paper author has shared that the designation of a site as World Heritage implies changes. Increased number of visitors, demand for new facilities, varieties of developmental works in the surrounding area and such other aspects affect the site with its landscape and setting to a large extent. Therefore proper management of such sites with its landscape and environment becomes imperative and prime responsibility of that site. Author discussed the initiatives proposed on site.		
5	Sustainable development of Indian Himalayan region: Linking ecological and economic concerns	J.S. Singh	2006
	Description The Indian Himalayan region occupies a special place in the mountain eco systems of the world. These geodynamically young mountains are not only important from the stand point of climate and as provider of life, giving water to a large part of Indian subcontinents but they also harbour a rich verity of flora, fauna, human communities and cultural diversity. Despite the abandon of natural resources, most of its people are marginalised and still live on substance level. The unscientific exploitation of the resources is leading to increasing environmental degradation and aggravating the impacts of natural hazards. Hence, there is a need to evolve new paradigm to restore balance between economic interests and ecological imperatives with due regard to socio cultural principles.		
6	Special Tourism Area - A Critical Study of Bekal	Sindhu Joseph	2007
	Description Bekal in Kerala identified as "Special Tourism Area" (STA) for integrated development, as per		

	the National Action Plan of 1992, with the objective of intensive development of the destination in coordination with the state governments and the private sector. offering the opportunity to set up a new planned resort destination. The Bekal Resort Development Corporation (BRDC) focuses on planned, environmental friendly and geographically viable methods of development. This article is a critical analysis of the potential of Bekal as a beach resort and the present stage development.		
7	Cave Tourism in Kerala: With Special Reference to Edakkal Caves	Sajith. m., V.K. janardhanan	2009
	Description Author has discussed the dimensions of prospective growth along with the Edakkal Cave tourism Development. Being one of the most attractive site for tourism the implications of development And challenges of tourism are discussed and the recommendations are made on the observation from other sites. Govt support in this direction is playing a key role. As it is its kind of unique site in India. Management issues and its solutions also has been suggested.		
8	The Dynamics of Tourism management in world heritage sites of Tamil Nadu	Anu Chandran	2011
	Description Author has discussed the realization of importance of protection and management of culture Heritage because of the increasing number of tourists visiting heritage attractions. Consequently impacting the structure and environment. Effort to evaluate the promotional strategies carried out by various tourism stakeholders vis a vis perception of tourists. Recommendations of conservation was also suggested keeping the view in prospect.		
9	Indigenous Tourism–An Ideal Sustainable Tourism Model for Wayanad, Kerala	PS SIBI, GA SWAMY	2011
	Description Author has discussed uniqueness of each destination in its own way. The alternative tourism is possible in one place may not be same for another. Identifying a suitable tourism model and to conduct a study on its feasiability are very much essential for rightly positioning a tourist		

	destination. The study examins the perceptions of the tourists about tourism in Wayanad and their performance for various forms. The indigenous tourism model is recomonded for Waynad adderess challenges it is facing.		
10	Critical Study of Bhimbetka as Tourist Destination of Madhya Pradesh Tourism	Sanjay Payasi, N.C. Jain, Mrs Sushma Sharma	2012
	Description Development of necessary infrastructure and facilities at any tourist destination is the first and most important step in maximizing the tourist satisfaction and for the promotion of that destination itself as major tourist attraction. The objective of the deficiency study conducted by Madhya Pradesh Tourism was to identify the deficiencies in the tourist destination in terms of urban infrastructure, management of civic services including garbage and solid waste disposal, management and implementation of forest and environment related projects and up gradation of electrical and water supply system.		
11	Remote Sensing & GIS based approach for Heritage conservation and management A CASE STUY IN BHIMBETKA AREA, DISTRICT RAISEN M.P., India: A WORLD HERITAGE site	P.K. Verma , Dr. Satish Chakravarty	2012
	Description Author discussed a comprehensive Remote Sensing & GIS based development plan for archaeological and socio-economic importance of Bhimbetka area.		
12	An Explorative View on Human Resource Management with Focus on Tourism & Hospitality Industry of India	Mohammad Amaan Khan	2014
	Description Author discussed the different aspects of human resource in the tourism & hospitality industry of India. Change in demand and supply pattern of human resource for travel industry. Author also discussed about the problem of talent crunch and high attrition rate.		
13	Sustainable Heritage Tourism Marketing through Intelligence ICT Solutions	Katiyar, R.C. Priyanka, P.	2015

	Description Aim of this paper is to suggest that adequate tourism growth can be executed by the use of intelligent ICT solutions in the development of heritage tourism that would help to achieve a more globally responsible paradigm for the tourism industry and facilitate the management of destinations and the coordination of the local suppliers in India.		
14	Sustaining responsible tourism – The case of Kerala.	J Kokkranikal, A Chettiparamb	2015
	Description Author has discussed the role of responsible tourism beyond the concept of sustainable developmen tourism is a concept that overlaps significantly with concepts of sustainable, ethical, pro poor, and integrated tourism. Author has mentioned the role of business in achieving sustainability. Author has discussed the process processes involved in operationalising the concept of responsible tourism' within the state of Kerala.		
15	Growth of Tourism Industry in Kerla and Need for Sustainable Development	Aswathy M.J	2016
	Description Author has discussed the role of tourism in contribution to economic development by providing job opportunities, foreign exchange earnings and as a major contributor to SDGP of Kerla. Author mentioned the direct relationship between the number of tourist's arrivals and total revenue in Kerala. As tourism growth is depends upon environmental quality the concept of sustainability has greater importance. Therefore the careful management of the sector is essential in order to reap in the maximum benefits with the minimum negative impact and to make it more environmentally and socially sustainable.		

2.3 A SUMMARY OF THE LITERATURE REVIEW ON MANAGEMENT OF CONSERVATION, DEVELOPMENT AND PROMOTION OF ROCK ART HERITAGE (Global scenario) – Table 1

			FACTORS AFFECTING ROCK ART MANAGEMENT																																											
S.N	Author	Year	Internal management																External management																											
			Managerial frame work for																Managerial frame work for																											
			Conservation						Development			Augumentation				Quality			Community involvment					Government / stake holders									Attracting tourists					Support Infrasturcture						WH Title		
			Ecosystem	Human vandalism	Natural disasters	Weathring	Habitation	Visitor impact	Social-cultural	economic	Ecological	Ecotourism	Cultural interpritation	Museum/replica	Others	Feedback	Gap fullfilment	Involvement	Awareness	Responcibility	Training	Jobs	National Identity	Coopration	Policy making	Execution	stake holder partnerships	Site management	Consultation	Funds	Technologies	Communication	Marketing	Interests,pattern,types	Market development	Postioning,branding	Strategies	Conectivity	Transport	Accomodation	Food and water	Power supply	Communication	Establishing antiquity	Management plan	Nomination dossiers
			Global Scenario																																											
1	Gale, Fay	1985	✓	✓				✓																																						
2	Gale, Fay	1986	✓	✓				✓																												✓									
3	Joao Zihao	1998	✓	✓		✓		✓	✓		✓																	✓										✓	✓		✓					
4	Ryan, Chris, Huy	2000																																✓			✓									
5	Ian D Clark	2002	✓	✓	✓	✓	✓	✓	✓	✓	✓																	✓									✓									
6	Dr. Elizabeth M.	2004	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓		✓		✓				✓	✓		✓		✓			✓				✓	✓								
7	B. Smith	2006	✓	✓	✓	✓	✓	✓	✓	✓	✓											✓	✓				✓	✓																		
8	Janette Deacon	2006	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓										✓																		
9	P Hjorth, A Bagh	2006							✓	✓	✓																																			
10	Savino di Lernia	2011	✓	✓	✓	✓	✓	✓	✓	✓	✓														✓	✓	✓	✓			✓															
11	Nicolas Senil	2011																																										✓	✓	
12	Jo McDonald an	2012	✓	✓	✓	✓	✓	✓	✓	✓	✓															✓	✓	✓							✓		✓								✓	
13	Melanie duval a	2012	✓	✓	✓	✓	✓	✓	✓	✓	✓																	✓									✓								✓	
14	J Kaminski, D Ar	2013						✓	✓	✓	✓							✓	✓	✓	✓				✓	✓	✓	✓		✓	✓						✓									
15	Virginia Jurenie	2014								✓												✓											✓		✓	✓	✓									
16	Nathalie Cayla,	2014	✓	✓	✓	✓	✓																					✓			✓															
17	Melanie duval a	2014																										✓						✓			✓									
18	Andrea Cendere	2015											✓		✓				✓												✓		✓				✓									
19	Neville Agnew, .	2015	✓	✓	✓	✓	✓	✓																		✓		✓																		
20	N. James	2016	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓														✓			✓		✓													

2.4 A SUMMARY OF THE LITERATURE REVIEW ON MANAGEMENT OF CONSERVATION, DEVELOPMENT AND PROMOTION OF ROCK ART HERITAGE (National scenario) – Table 2

FACTORS AFFECTING ROCK ART MANAGEMENT

S.l	Author	Year	Ecosystem	Human vandalism	Natural disasters	Weathring	Habitation	Visitor impact	Social-cultural	economic	Ecological	Ecotourism	Cultural interpritation	Museum/replica	Others	Feedback	Gap fullfilment
			Internal management														
			Managerial frame work for														
			Conservation						Developmen			Augumentation				Quality	
			National Scenario														
1	R.G. Bednarik	1994	✓	✓	✓	✓											
2	Abhiman Das	1999							✓	✓							
3	R Ray, AR Ram	2002	✓	✓	✓	✓	✓	✓			✓						
4	S.B. Ota	2005	✓	✓	✓	✓	✓	✓					✓				
5	J. S. Singh	2006							✓	✓	✓						
6	Sindhu Josepl	2007	✓	✓	✓	✓	✓	✓				✓	✓				
7	SAJITH. M. and	2009															
8	Anu Chandrar	2011	✓	✓	✓	✓	✓	✓									
9	PS SIBI, GA S\	2011	✓														
10	Sanjay Payasi	2012	✓	✓	✓	✓	✓	✓	✓	✓	✓						
11	P.K. Verma & I	2012	✓	✓		✓	✓		✓								
12	Mohammad A	2014							✓								
13	Katiyar, R.C.ar	2015															
14	J Kokkranikal,	2015										✓					
15	Aswathy M.J	2016	✓						✓	✓	✓						

S.l	Author	Year	Involvement	Awareness	Responcibility	Training	Jobs	National Identity	Coopration	Policy making	Execution	stake holder partnerships	Site management	Consultation	Funds	Technologies	Communication
			External management														
			Managerial frame work for														
			Community involvmer							Government / stake holders							
			National Scenario														
1	R.G. Bednarik	1994											✓				
2	Abhiman Das	1999															
3	R Ray, AR Ram	2002		✓	✓	✓				✓	✓	✓	✓	✓	✓		
4	S.B. Ota	2005	✓									✓	✓				
5	J. S. Singh	2006															
6	Sindhu Josepl	2007															
7	SAJITH. M. and	2009											✓				
8	Anu Chandrar	2011										✓					
9	PS SIBI, GA S\	2011															
10	Sanjay Payasi	2012								✓	✓		✓			✓	
11	P.K. Verma & I	2012											✓			✓	
12	Mohammad A	2014				✓	✓										
13	Katiyar, R.C.ar	2015											✓				✓
14	J Kokkranikal,	2015	✓	✓	✓								✓				
15	Aswathy M.J	2016					✓						✓				

S.l	Author	Year	Marketing	Interests,pattern,types	Market development	Postioning,branding	Strategies	Conectivity	Transport	Accomodation	Food and water	Power supply	Communication	Establishing antiquity	Management plan	Nomination dossiers
			External management													
			Attracting tourists					Support Infrasturcture						WH Title		
			National Scenario													
1	R.G. Bednarik	1994														
2	Abhiman Das	1999														
3	R Ray, AR Ram	2002								✓	✓			✓	✓	✓
4	S.B. Ota	2005						✓								
5	J. S. Singh	2006														
6	Sindhu Josepl	2007														
7	SAJITH. M. and	2009			✓		✓									
8	Anu Chandrar	2011		✓			✓									
9	PS SIBI, GA S\	2011		✓	✓	✓	✓									
10	Sanjay Payasi	2012		✓	✓			✓	✓	✓	✓	✓				
11	P.K. Verma & I	2012														
12	Mohammad A	2014					✓									
13	Katiyar, R.C.ar	2015	✓		✓		✓									
14	J Kokkranikal,	2015		✓	✓		✓									
15	Aswathy M.J	2016			✓		✓									

2.5 SUMMARY OF RESEARCH GAP - NATIONAL PERSPECTIVE

Awareness about the rock art heritage, especially in India is growing with a very slow speed. Lack of significant scientific research is restricting the potential growth of rock art heritage in India. For instance Bhimbetka complex of rock shelters is the only site in India nominated as the World Heritage site by UNESCO. Even at Bhimbetka the importance of conservation and protection is dominating and preferred over its overall development and promotion. The interpretation centre was proposed in 2003 but till 2017 only the land could be acquired. Slow speed of execution of plans is restricting the due growth of rock art heritage in India. The literature review of the research work on rock art heritage also indicates that the holistic development and promotion of rock art heritage is a neglected area in Indian context. It needs immediate attention. Therefore Bhimbetka in particular and other protected rock art heritage sites in general need a sustainable frame work to develop and promote the rock art sites and its economic viability through the route of tourism development. Till now there is no policy framework to conserve, preserve and promote rock art heritage sites is developed.

2.6 CHALLENGES

1. All Rock Art sites are not systematically documented and scientifically studied for establishing their significance and highlighting the need for their conservation and tourism development.
2. Rock art heritage sites are found in varied geographical, topographical and climatic zones. Therefore various stake holders are there. The Archaeological Survey of India (ASI) or the State Department of Archaeology, Department of forest and Department of Tourism are the three major stake holders for the protection and promotion of the rock art sites. Standard, holistic, rock art heritage management and promotion strategy is lacking in Indian context to provide optimal output of efforts and resources of all the stake holders to achieve the objectives.
3. Tourist pattern, their types and specific demands also come to the notice in the discussion with the authorities in ASI Bhopal Circle and Agra Circle.

4. Augmentation of the site to increase attraction points as being done in France, Australia and other countries. It needs heavy investment and building an experiential system is a big challenge.

3. NEED OF THE STUDY

1. Conservation and protection - India is very rich in rock art heritage which is an integral part of the nature and humanity. Rock art sites are a great source of attraction and learning. Each rock art site is a primary site and had been a centre of human activities for a long time right from the Stone Age. The authors of rock art had expressed and stored their thoughts and memories about their perception of reality and culture in the form of rock art on the bare surface of bedrock.
2. Growth opportunity - Countries like France (Chauvet cave in southern France), and Australia (Kakadu National Park in northern territory of Australia) have made the best use of their rock art heritage for their economic and cultural growth.
3. Untapped resource - India has not utilised her rich rock art heritage for sustainable and holistic development till now. Therefore, there is a great potential to use it for the sustainable development of the region, country and community at large.
4. Scope - Tajmahal as a heritage site earned INR 85 Corer of revenue by ticketing in five years (2007-12) excluding other indirect revenue generation. Where total money spent on conservation and maintenance was only INR 8 Corer. That creates an immense opportunity in heritage tourism capacity building specifically rock art heritage in India for future.
5. Management requirement - Therefore, the rock art heritage and rock art sites need to be conserved and promoted globally in a strategic planned way as the early great heritage of the humanity.
6. Contribution – its holistic development and promotion can contribute in national GDP, providing jobs, local business opportunity, aid in glorifying national identity and will help in the sustainable development and promotion of the regions.

4. OBJECTIVES

1. To study and evaluate the archaeological and cultural significance of Rock Art heritage in India.
2. To analyse socio-environmental-economic vulnerabilities and challenges faced in effective conservation, development and promotion of rock art heritage with reference to selected sites in India.
3. To examine the scope and effectiveness of the existing Institutional set up and programmes for the development and promotion of selected Rock Art sites in India.
4. To examine the appropriateness and the application of the holistic Systems approach in addressing the issues and challenges faced in promotion and managing the rock art sites.
5. To suggest an integrated sustainable model with multiple resources and mechanism for coordination of different stakeholders for holistic conservation, development and promotion of the selected heritage sites.

5. HYPOTHESIS (proposed)

Ho1: There is no relation among antiquity, authenticity and protection of Rock Art sites set in India to World Heritage status eligibility of the UNESCO other than Bhimbetka

Ha1: There is significant relation among antiquity, authenticity and protection of Rock Art sites set in India to World Heritage status eligibility of the UNESCO other than Bhimbetka

Ho2: There is no relation among sustainable conservation, development and promotion of Rock Art sites to community development.

Ha2: There is significant relation among conservation, development and promotion of Rock Art sites to community development.

Ho3: There is no effectiveness in existing Institutional setup and programmes for the holistic development of Rock Art sites in India.

Ha3: There is significant effectiveness in existing Institutional setup and programmes for the holistic development of Rock Art sites.

Ho4: There is no relation between development of Rock Art site in India and the role of various stakeholders (Systems approach) for sustainable development.

Ha4: There is a significant relation between development of Rock Art site in India and the role of various stakeholders for sustainable development.

6. RESEARCH METHODOLOGY

As the approach is holistic, that includes all the stake holders and their inputs. This study will focus on sustainable conservation, development and promotion of Rock Art Heritage sites. By nature this research would be Descriptive and Analytical at different stages of analysis.

6.1 SAMPLING TECHNIQUE

Judgement sampling

Rock art sites are distributed throughout India which forms population for the present study. Judgement sampling in the selection of sample of Rock Art sites is used. However, all of them have not been studied properly to evaluate their actual cultural value and significance till date. There are only 14 selected sites in India of which cultural significance has been projected and declared as protected sites in different parts of the country. Hence, Judgement sampling in the selection of Rock Art Sites has been used on the basis of protected sites. Details of the selected protected sites in India, either by the Central Government or State Governments, are given.

Table – 3

S.No	Name of the Site	State	Protected by
1	Bhimbetka	Madhya Pradesh	Archaeological Survey of India
2	Chaturbhujnathnala	Madhya Pradesh	Archaeological Survey of India
3	SitaKhardi	Madhya Pradesh	Archaeological Survey of India
4	DarakiChattan Cave	Madhya Pradesh	M.P. State Department of Archaeology
5	Adamgarh rock shelters	Madhya Pradesh	Archaeological Survey of India
6	Pachmarhi	Madhya Pradesh	Archaeological Survey of India
7	Eddakkal Cave	Kerala	Kerala State Department of Archaeology
8	Sittanivasal	Tamilnadu	T. N. State Department of Archaeology
9	Usgalimol/pancimol,	S. Goa	Goa State Department of Archaeology
10	VikramkholSundergarh	Orissa	Archaeological Survey of India
11	Hathigumpha cave	Orissa	Archaeological Survey of India
12	PanduanLalitpur	Uttar Pradesh	Archaeological Survey of India
13	Talpura	Uttar Pradesh	Archaeological Survey of India
14	Alania	Rajasthan	Rajasthan State Department of Archaeology

(asi.nic.in)

Scheme of Sampling

To consider the point of view of all stakeholders a substantial representative of all the nine stake holders has taken and below mentioned is a detailed scheme of coverage of respondents as per the distribution and availability of various stakeholders including the local community people. The sample is being drawn as per the convenience and availability from the selected respondent groups.

S.No.	Stake Holders	Sample size	Justification	Data Collection tool
1.	Visitors	228	As the population becomes infinite – Bill Godden's formula used : n=(Sigma)^2 x Z^2/D^2→ 1^2(1.96)^2/(0.10)^2=227.21=228 Where Sigma=1, Z=1.96, D=0.10	Questionnaire

2	Archaeological Survey of India	94	Assistant Archaeologist-2, Conservation Assistant-1, Attendants-2, Security Staff-3, others 2 =10 at individual site which are under ASI. These sites are 9 in numbers out of 14.(All the officials related to the ASI has been taken in all the nine sites) 10x 9 =90 + Superintending Archaeologist-2 , Deputy Superintending Archaeologist-2 = 4 It makes 90 + 4 = 94	Structured personal interview/ Questionnaire
3	Dept. of State Archaeology(M.P., Goa, Rajasthan, Tamilnadu, Kerala)	15	Commissioner-1, Museum keeper-1, Assistant Archaeologist -1 There are 5 sites in numbers out of 14.(All the officials related to the State Archaeology has been taken in all the nine sites) Totat=3 x 5 = 15	Structured personal interview/ Questionnaire
4	Dept. of Forest	42	Divisional Forest officer-1, Deputy Forest Officer-1, Ranger-1 & Total Sites= 14 Total =3 x 14=42	Structured personal interview/ Questionnaire
5	Dept. of Tourism	42	Director-1, Information officer-1, member of Advisory committee-1 & Total Sites= 14 Total = 3 x 14 = 42	Structured personal interview/ Questionnaire
6	Experts	17	Director Indian Institute of Tourism and Travel Management Gwalior-1, Prof. A. Sundra(Rock Art expert)-1, Prof. R.C. Agarwal(Former DG ASI)-1, Prof V.H. Sonavane(Member and advisior of ASI general body)-1, Shri S. B. Ota (Expert on Bhimbetka management)-1, Shri B.R. Mani-1, Sri O. P. Mishra-1, Advisor, UNESCO-1, Convener IFRAO-1, Members IFRAO , others – 8	Structured personal interview/ Questionnaire
7	Community people	22	Approx 22 villages are located in the area of Bhimbetka. Single respondent is representing one village (as villages are the tribal small hamlets of a few families. Hence 1 surpunch / mukhiya will be taken as representative of village) So total respondents will be 22	Structured personal interview/ Questionnaire
8	NGO	2	RASI President-1, General Secratery-1(only known NGO's working in Rock Art)	Structured personal interview/ Questionnaire
9	Private Partners	86	Advertising agencies – 1 x 14 = 14, investors local – (on the basis of availability of information through	Structured personal interview/

			local resources) – 2 x 14 = 28, travelling agencies local -2 x14=28, travelling agencies online-Make my trip-1, goibibo-1 , others 1 x 14 = 14.	Questionnaire
	Total respondents	548		

Questionnaire – Total of six questionnaires / interviews will be framed to collect the data. Following are the categories.

	Stake holders	**Focus of Questionnaire / Interview**
1	ASI & State Archaeology	Conservation & Protection
2	Forest Department	Development
3	Tourism Department	Development and promotion
4	Visitor	Motivations, Expectations
5	Experts	Conservation, Development, promotion
6	Private partners	Development and promotion

6.2 SCOPE OF THE STUDY

Rock art as a tradition and heritage is found in various regions throughout India (Kumar 2015). But the formal documentation and research needed to establish the sites as antiquity is not done in India as a whole. Only number of sites could be studied and put into light of Govt. for protection. After this process only the Govt. take responsibility of protecting it. As Govt, has to be involved being the key stakeholder in the process of dealing with heritage value. So the Study will be done of all the protected Rock Art Heritage sites in India by Govt. Total of fourteen sites out of India could be found which are protected by ASI or State Archaeology . Different states comprising Madhya Pradesh, Uttar Pradesh, Rajasthan, Orissa, Tamilnadu, Goa and Kerala.

6.3 DATA COLLECTION: Will be based on both primary and secondary for the proposed research.

Primary data – Data will be collected from the respondents through structured questionnaire and structured interviews.

Secondary data - Documents (proposed) – Available from UNESCO convention and its advisory bodies: Eligibility criteria for World Heritage sites, World Heritage capacity building-ICCROM,

Compendium of Best Practices in Sustainable Tourism, Community development through World Heritage - UNESCO World , Sustainable Tourism, UNESCO World Heritage and Sustainable Tourism Programme (action plan, Policy for the Integration of a Sustainable Development Perspective into the Processes of the *World Heritage Convention*), Towards a Jurisprudence of Sustainable Development in South Asia etc.

Books – Rock Art of India, Stone Age Painting in India, Indian Prehistory as revealed by excavations, explorations and rock art study at Bhimbetka and in the adjoining regions, Prehistoric Indian rock paintings, Management of Northern Territory(Australia), other books and Journals on sustainable development, tourism development etc.

6.4 TOOLS TO BE USED FOR DATA ANALYSIS (PROPOSED)

1. Systems dynamics – To analyse the internal structural dynamics and operating policies including all stake holders and using the same understanding to design high leverage policies for desired success using causal loop diagram and simulation, if possible.
2. Multiple correlations / multiple regressions – To identify the relative operating standards, relations and conditions among individual sites as studied.

7. PROPOSED CHAPTERIZATION OF THESIS

CHAPTER-1 INTRODUCTION

Rock Art a global heritage

Rock Art Heritage an integrative system in India

Rock Art development and promotion

World Heritage Convention and its role

Rock Art and Tourism in India

Systems Approach and its significance

Interactive conceptual model of Rock Art Heritage system

CHAPTER-2 REVIEW OF LITERATURE

Global perspective

National perspective

A summary of the literature review on development and promotion of Rock Art heritage

Summary of research gap - National perspective

Challenges

CHAPTER-3 DATA COLLECTION AND DATA MAPPING

CHAPTER-4 ANALYSIS OF PRIMARY DATA

CHAPTER-5 CONCLUSIONS AND SUGGESTIONS

REFERENCES / BIBLIOGRAPHY

APPENDIX- I- Questionnaire

II- Other relevant documents

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